IDSCIPUB
Indonesian Scientific Publication

Harmonia
Journal of Music and Arts

Check for updates

OPEN ACCESS

*CORRESPONDENCE
Kow Arkhurst,
kowarkhurst@gmail.com

RECEIVED 22 December 2025
ACCEPTED 10 February 2026
PUBLISHED 27 February 2026

CITATION
Yeboah RA, Arkhurst K (2026) Teachers' Perceptions of AI-Assisted Music Composition Tools in Music Education: A Thematic Critical Review With Implications for Ghanaian Colleges of Education. *Harmonia : Journal of Music and Arts*. 4 (1), 1-8.
doi: 10.61978/harmonia.v4i1.1263

TYPE Original Research
PUBLISHED 27 February 2026
DOI 10.61978/harmonia.v4i1.1263
VOL 4 Issue 1 February 2026

Teachers' Perceptions of AI-Assisted Music Composition Tools in Music Education: A Thematic Critical Review With Implications for Ghanaian Colleges of Education

Richmond Amoh Yeboah[1], Kow Arkhurst[2*]

[1] Agogo Presbyterian Women's College of Education, Ashanti Region, Ghana
[2] Abetifi Presbyterian College of education, Eastern Region, Ghana

Abstract

AI tools support music learning tasks such as composition scaffolding, automated feedback, and adaptive practice. Evidence on teacher-facing use remains uneven, and recent studies give limited attention to African teacher-education settings. This review synthesises 2024–2025 research on teachers' perceptions of AI-assisted music composition tools, focusing on perceived benefit, effort, risk, ethics, authorship, and assessment integrity, and draws evidence-bounded implications for music teacher education in Ghanaian Colleges of Education. A structured thematic synthesis was conducted using only the studies listed in the provided annotated bibliography. Screening retained sources that (a) addressed AI tools used for composition or composition-related analysis in formal education and (b) reported teacher, teacher-educator, or pre-service teacher perspectives, alongside systematic reviews and educator-facing conceptual scholarship. Data extraction captured publication year, setting, participant group, AI tool type, learning task, and reported perception constructs. Deductive coding grouped findings under instructional value, usability and effort, creative support and dependency, ethics and authorship, assessment integrity, and institutional readiness.

Across the source set, studies report perceived gains in feedback speed, practice efficiency, and learner autonomy, alongside concerns about overreliance, plagiarism risk, blurred authorship, and weak assessment governance. Teacher AI literacy and readiness recur as constraints. Implications include targeted AI literacies in teacher education, assessment redesign, and ethical decision-making support. Limits include a restricted source set and the absence of Ghana-based empirical studies within the included literature.

KEYWORDS

ai-assisted composition; teacher perceptions; music teacher education; assessment integrity; authorship ethics.

Introduction

Artificial intelligence has been rapidly integrated into music classrooms, not just as a novelty but as something that actually seems to think, or at least to act like it does. It now helps with composing, gives instant feedback, and even advises students on how to practice better, sometimes giving the strange impression that it knows as much as the teacher, or even more in some narrow sense (Merchán Sánchez-Jara et al., 2024; Zhang et al., 2025). Studies from 2024 and 2025 show that AI tools speed up feedback and track practice habits, and some say accuracy,

improves although creativity results are still a bit all over the place (Ou, 2025; Yuan, 2024). Other researchers have gone further, looking at generative systems and large language models that help students come up with musical ideas or explain complex theories (Cheng, 2025; Zhao et al., 2025).

It is almost absurd yet fascinating that machines can now "explain" harmony as if they were part of the band or maybe pretending to be. However, classroom experience depends heavily on the teacher's comfort level and confidence. Some teachers are enthusiastic, while others barely know where to click. Research in teacher education keeps showing uneven AI literacy, with many educators having seen AI only in short demonstration sessions (Klnçer, 2025; Shaw, 2024).

This unevenness affects their willingness to use the tools, and sometimes they simply avoid them. Ethical concerns keep surfacing with music ownership, plagiarism, and the fear that students might start trusting the machine's ear more than their own (O'Leary, 2025; Smith, 2024). In some cases, it becomes unclear whether the student composed something or merely asked the machine to do it, which is a kind of authorship ghosting. In this review, AI-assisted composition tools are defined as any AI-based application that can generate, modify, analyse, or recommend musical content to aid composition. These include melody and harmony generators, style imitators, and analytical systems used for learning (Martínez-Heredia & López, 2025).

The term "teacher" is used broadly for anyone involved in music instruction—whether practising educators or trainees who plan lessons, design tasks, or assess students. "Perception constructs" refer to teachers' expressed opinions about the benefits, effort, risks, ethics, authorship, and fairness in grading (O'Leary, 2025; Shaw, 2024; Smith, 2024). These definitions might sound dry, but they matter because everyone seems to mean something slightly different when they say "AI in music teaching". One major gap in the literature is that most studies come from well-resourced universities with fast internet and shiny devices, while teacher education in low-resource settings hardly appears (Merchán Sánchez-Jara et al., 2024; Zhang & Liang, 2024).

Research often focuses on student outcomes or tool performance rather than on how teachers make decisions in class (Holster, 2024). This gap is especially visible in Ghanaian Colleges of Education, where imported educational policies rarely fit local realities—power cuts, limited devices, and assessment rules that do not quite match the technology. The mismatch keeps repeating itself, as if no one learns from the last policy wave. This review brings together literature from 2024 to 2025 on teachers' perceptions of AI-assisted composition tools, with attention to what it might mean for Ghanaian music teacher training. The findings were grouped around benefits, effort and usability, risks, ethical and authorship concerns, and assessment effects, although the boundaries between these themes were sometimes fuzzy.

This study has some limitations. This review only covers recent studies from 2024 to 2025, chosen to capture the latest developments during this rapid AI boom. This means that older foundational work is left aside, which could have offered deeper grounding.

The synthesis is narrative, not systematic; therefore, the interpretation may lean one way or another. Publication bias is also possible because the field is still young and fashionable. Drawing lessons for Ghana from the global literature is tricky; it is like translating a melody into another key and hoping it still sounds right. Therefore, this study aims to answer the following three questions: RQ1. What benefits do teachers report regarding AI-assisted composition tools in music teaching and learning? RQ2. What efforts, usability challenges, risks, and ethical issues do teachers identify, including concerns about authorship and fairness in assessment? RQ3. What lessons can be drawn from the available evidence for Ghanaian teacher education?.

Thematic Review of Literature

Artificial Intelligence as a Pedagogical Tool in Music Education

Many people who do research agree that artificial intelligence in music education works as a helpful tool for people to practice get feedback and get assessed. It does not replace the music teachers.

Artificial intelligence in music education has some points. Many studies have found that artificial intelligence tools are helpful in areas. For example people who use intelligence tools in music education tend to do better with timing, pitch and rhythm. They also practice efficiently and do well on their music tasks in the short term. Artificial intelligence in music education is good, for these things. Research done in settings or using apps shows that Artificial Intelligence helps people learn when it gives them feedback right away on what they are doing. For example Yuan found out in 2024 that people got better at rhythm when they used Artificial Intelligence. Ou found out in 2025 that people were more motivated to learn and controlled their learning better when Artificial Intelligence gave them feedback that changed based on what they needed. This kind of feedback, from Artificial Intelligence really helps people learn.

The thing is, people who study education do not always agree on what works. Some people think that motivation and getting students involved is really important. On the hand some people only look at test scores and do not think about how artificial intelligence can help students become better musicians like being able to express themselves or play well with others. These studies are all different. Most of them were done in colleges with a lot of resources so it is hard to say if the results would be the same everywhere, with music education and artificial intelligence. When we look at the results we usually focus on things that students can do away like playing a song perfectly. We do not think about the picture like how music can affect them in the long run or how they can really understand the music. The music teachers are also not always paying attention to what the computer program's saying to the students. So it is hard to know how the teachers feel about what the computer's telling the students or if they even care about the music feedback that the computer is giving. Music teachers and their students and the computer program all need to work for the students to really learn music.

This presents a significant implication for Colleges of Education in Ghana. The most robust evidence for AI tools indicates they are effective in structured tasks that have clearly specified results. Nonetheless, teacher trainees in Ghana must cultivate the ability to teach musical interpretation, creativity, and culturally rooted performance—not merely technical exercises. As a result, research findings should be applied to Ghanaian contexts with caution, ensuring that broader learning objectives beyond mere skill repetition are taken into account

Generative AI and Creativity

In the field of generative AI, the discussion doesn't only sit on accuracy anymore it's more about who owns what, who made what, and how creativity even happens now.Comprehensive reviews of AI music generation tools confirm rapid innovation in composition assistive technologies (Zhao et al., 2025)." The literature keeps circling two opposite camps. One side, like O'Leary (2025), warns that AI's hidden defaults quietly steer learners into repetitive predictable patterns, so exploration gets smaller and smaller. Cheng (2025) notes that while AI can support ideation, the risk of reduced student originality remains a valid concern. In that sense, the danger isn't just cheating, it's the slow fading of independent creative thought, which is maybe worse actually.Systematic reviews confirm that AI generation methods can provide scaffolding for novice composers (Carnovalini & others, 2025)."

The other side says something quite different, that generative AI can actually help creativity if it's used in a structured way. A 2025 study in Frontiers in Psychology found that AI-assisted co-creation raised creative self-efficacy and made group composition more inclusive and lively. From this angle, AI becomes a kind of scaffold, a helper for beginners who might not know how to start making something new, or who freeze at the blank page moment. It's not replacing creativity, it's sort of nudging it forward.

But the contradiction between these findings might not be real disagreement, more like a confusion of methods. Studies that focus on risk look at ethics assessment and classroom norms while those that praise AI measure confidence participation or just output quantity. Hardly any use shared measures of creativity like expert ratings of originality or tracking how students compose once the AI is gone, which makes comparison almost useless and conclusions floaty.

For Ghanaian Colleges of Education, the takeaway is practical: classrooms need clear assessment rules and teaching structures that protect student agency. Without such frameworks, AI might boost participation yet blur authorship and weaken critical thought about musical decisions.

Teacher Readiness and Professional Capacity

Teacher Readiness and AI Integration in Music Education Across the reviewed writings, teacher readiness keeps showing up as one of the biggest, maybe the biggest, barriers to adopting AI tools in music education. Interview studies with secondary music teachers reveal that educators value AI for idea generation but worry about authorship and overreliance (Odena & Cabedo-Mas, 2024). Observations of generative AI use in higher education show varied adoption levels based on student confidence (Stahlke, 2024). Many of the studies try to measure this readiness through things like AI literacy, confidence in using technology and whether teachers actually get useful training chances. For instance, Kılınçer (2025) discovered that pre-service music teachers mostly had average levels of AI literacy and quite low confidence when it came to applying AI tools in their teaching. These results repeat what others have said, that teacher education programmes often skip giving teachers long-term, hands-on contact with AI-based teaching methods, which is strange because the tools keep changing faster than the training does.

Yet, some researchers say the readiness problem is not only about skills or knowing the tools. Shaw (2024) and Daley (2025) both stress that teachers are not just users but interpreters, they guide how students think about musical meaning and ethical creation. They are like translators of digital sound into human sense. This changes the idea of readiness from just being able to use a tool to having broader pedagogical control, like designing lessons, shaping feedback talks and setting classroom rules about attribution and assessment. Sometimes it's confusing how this control is measured or even if it can be measured at all, which makes the whole thing a bit circular really.

Kim & Park, (2024) point out a deeper structural issue that AI tools are racing ahead but research on how to fit them into teaching is crawling behind and the mismatch keeps widening. This gap matters especially for Colleges of Education that need not only tool manuals but adaptable teaching routines and curriculum plans.

For Ghanaian Colleges of Education, the message is clear but complicated. Building teacher readiness has to be deliberate not accidental, not something that just happens during ICT training. Indicators might include training hours completed, observed classroom use of AI tools, supervised micro-teaching, and formal evaluation of AI-related skills. Without such systems teacher preparedness will stay uneven, limited, and probably misunderstood.

Ethics, Equity, and Cultural Fit

Ethical and Equity Concerns in AI and Music Education Ethical and fairness worries keep showing up in almost every study about AI in education, but somehow the actual measurement of these risks is still thin or even missing. Student perceptions of AI adoption and training have also been found to influence the ethical climate in arts classrooms (Vázquez-Parra et al., 2024). People talk about authorship—like, who actually made the work, the human or the system—and about assessment honesty, meaning whether AI use makes grading fair or not. There's also the matter of bias, if the system quietly prefers certain musical styles or learner types, and then privacy, meaning what happens to the student's input once it's fed into the machine. And equity, of course, which is a big one—since not everyone has the same access to devices, paid software or even a stable internet connection. Scholars such as O'Leary (2025) and Smith (2024) keep saying these aren't imaginary problems, they are already shaping how both students and teachers live with AI tools in their classrooms.

Although ethics gets a lot of talk time, cultural fit doesn't get nearly the same attention. Kim and Park (2024) point out that many AI tools are built without thinking about local music systems at all. In places like Ghana, that becomes a serious concern. Local music education there is more about indigenous performance, group participation, and oral learning, all of which are mostly ignored by the big AI systems. It's like the tools were made for someone else's classroom, not theirs.

The biggest gap in the research is the lack of real measurement. Hardly any studies include bias audits or access data or even cultural representation checks. For instance, no one seems to report whether these tools include African rhythmic vocabularies, support local repertoires, or use training data that actually connects to Ghanaian traditions. Without such measurement it's almost impossible to know if AI tools really match the values and needs of different learning environments. It's like trying to grade a performance without hearing the music.

For Ghanaian Colleges of Education, this means adoption shouldn't just depend on whether the tool works or improves performance. Teacher education

programmes should also think about cost, device compatibility, internet reliability and whether the content reflects Ghanaian culture. Ethical rules must clearly state how data is stored, who gets credit for authorship, and how fair access is ensured.

Consolidated Gaps in the Evidence Base

Across the studies, four main holes appear. First, most research happens in universities or rich regions, leaving out Colleges of Education and low-resource settings, which makes the results less useful for Ghana. Second, student outcomes are everywhere, but teacher evidence is weak. Few studies describe teacher habits, training contexts, or daily use in enough detail. Third, there's no shared way to measure creativity, and many studies just skip it. Finally, even though ethics and equity are often mentioned, they rarely come with numbers or audits to prove anything.

These gaps matter because they make it hard to trust how findings apply to Ghana's teacher education. AI may help with accuracy and speed, but risks still gather around teacher readiness, authorship honesty, unequal access and the fading of local musical forms. So for Ghanaian Colleges of Education, a careful, maybe slower approach is better—one that mixes AI's promise with planning about training ethics infrastructure and culture, all at once really.

Methods

Methodological Review and Thematic Synthesis

This review kind of followed what could be called a structured thematic synthesis, though not entirely perfect in its reproducibility since the process itself was a bit boxed in. The evidence base was deliberately small, drawn only from the annotated bibliography that came with the manuscript, which was treated as the full universe of sources. No external databases were touched, not even Google Scholar which might have helped but also distracted. This narrowness kept the review aligned with the manuscript's focus but also, honestly, made it a bit thin in coverage, as will be explained later, or maybe not fully explained but hinted at.

The search period matched the years in that bibliography, roughly 2024 to 2025, which is a short window but that was the point. Since the bibliography was already the source, there was no keyword search, no Boolean strings, nothing fancy. Still, the team wrote down every title, abstract and full text they looked at just to show that the process was visible and not hidden behind closed doors. Transparency was the word, or at least the intention.

Screening happened in two rounds. First, titles and abstracts were checked for whether they talked about AI tools in music composition or analysis, or how teachers felt about using them in classrooms, or how AI connected to music learning. Then came the second round, the full-text screening, which was basically the same thing but slower. Studies were thrown out if they only talked about AI music for fun or entertainment, or if they only mentioned students' feelings without teachers, or if they didn't give enough methodological detail to extract anything useful. A few papers were confusingly half-relevant, and deciding on those took longer than expected, maybe too long.

For the studies that made it through, data extraction was done using a structured sheet, though sometimes the structure felt more like a suggestion than a rule. The sheet included things like publication year, study location, education level, participant type, sample size, design, AI tool type, learning task, comparison conditions, and outcome measures. Also, the teachers' perceptions were noted—things like whether they thought the tool was useful, easy, ethical, or supported by their institution. Implementation context was added too: what kind of infrastructure they had, whether there was training, and if any policies were mentioned. Some studies didn't say much about these, others said too much and still not enough.

The thematic analysis used a two-pass coding approach, though "two-pass" sounds neater than it really was. In the first pass, a deductive codebook borrowed from earlier research on teacher technology adoption was used. Codes were grouped into four big categories: instructional value, effort and usability, ethics and assessment, and institutional readiness. Then came the second pass, which was more inductive, reorganising everything into cross-study themes. Contradictions were logged, edge cases confused everyone, and some recurring methodological flaws were noted again and again. Each theme was linked back to its source studies through an evidence map, which looked tidy on paper but was messy in practice, really.

Study quality was judged using a checklist that tried to respect different designs. Quantitative studies were checked for sampling clarity, measurement transparency, and whether the statistics made sense. Qualitative ones were judged for how participants were chosen, how deep the data went, and whether they did credibility checks like triangulation or member checking. Systematic reviews were looked at for inclusion clarity, search transparency, and logical synthesis. These ratings were then used to decide how much weight to give each study though oddly, the higher-risk studies were sometimes used to identify hypotheses, which sounds backwards but was intentional, sort of.

The limitations are mostly the result of how the review was built. Relying on a fixed bibliography meant that only recent, mostly international papers were included, leaving out older or grey literature that might matter, especially for African or Ghanaian contexts. Without a broader search, studies using different terms for the same ideas might have been missed. None of the included studies were from Ghanaian Colleges of Education, so the review cannot say anything concrete about local realities. The findings are more like transferable hints that need local grounding. Also, inter-coder reliability wasn't calculated, which might mean the themes are slightly subjective or just human. These issues don't destroy the review's value but they do make it something to be read with care when thinking about teacher education policy or curriculum work in Ghana.

Result and Discussion

Study selection and screening output

The review corpus was restricted to the items listed in the provided annotated bibliography (2024–2025). Each record was screened in two stages.

Stage 1, title and abstract screening

Inclusion required a clear education focus and an explicit link to AI-supported composition tasks or composition-adjacent activities used in composition learning (for example, harmonic analysis tools used in composition classes). Records focused only on non-educational music generation, or on learner-only perception with no teacher or

teacher-education relevance, were excluded.

Stage 2, full-text eligibility check

Eligible records were retained if they reported at least one of the following:

1. Teacher, instructor, or teacher-candidate perceptions of AI tools used in composition or composition learning.
2. Systematic review evidence with teacher-facing, curricular, ethical, or implementation implications for music teaching.

PRISMA-style flow reporting
Records identified from annotated bibliography: n = 20
Records removed as duplicates: n = 1
Records screened (title/abstract): n = 19
Records excluded at screening: n = 2
Full-text records assessed: n = 17
Full-text records excluded with reasons: n = 0
Studies included in synthesis: n = 17
Screening exclusions (n = 2)

Non-educational focus
No teacher-facing content or no composition-related focus

Characteristics of the included literature
The included set covered three broad study types:

1. Systematic reviews and syntheses mapping AI use in music education and reporting barriers tied to teacher readiness and governance (Merchán Sánchez-Jara et al., 2024; Zhang et al., 2025).
2. Empirical studies testing AI-assisted systems for practice, tutoring, or composition-adjacent learning tasks, often reporting learning gains but with limited teacher-facing data (Jin & Zhao, 2025).
3. Conceptual, ethical, and teacher-facing discussions addressing authorship, assessment integrity, and pedagogical control in generative AI contexts (O'Leary, 2025; Shaw, 2024; Smith, 2024; Cheng, 2025; Daley, 2025). (See Table 1).

Table 1. Study Inclusion Matrix for the Thematic Synthesis (N = 25)

ID	Study (APA in-text form)	Publication Type	Education Level or Context	Participants Reported	AI Tool Category	Composition Related Task	Teacher Perspective Reported	Main Outcomes Reported	Perception Constructs Captured	Inclusion Decision, Reason
1	Merchán Sánchez-Jara et al. (2024)	Systematic review	Mixed, mostly higher education	Studies, not single sample	AI tutoring, feedback, creative AI	Includes composition support as one strand	Yes, teacher readiness and barriers discussed	Personalisation, feedback efficiency, engagement; barriers in access, readiness, ethics	Benefit, effort, ethics, readiness	Included, high relevance overview and teacher-facing issues
2	Zhang et al. (2025)	Systematic review	Mixed, mostly higher education	Studies, not single sample	Adaptive, feedback, generative AI	Includes creative and composition uses	Yes, teacher training gaps discussed	Accessibility, engagement, implementation challenges	Benefit, effort, readiness, equity	Included, maps trends and constraints, links to teacher training
3	*The Use of AI in Music Teaching in Higher Education, (2025)*	Review, preprint	Higher education	Studies, not single sample	ITS, generative assistants	Composition assistants noted	Some instructor perspective	Autonomy, efficiency; resistance linked to training and ethics	Benefit, effort, ethics, readiness	Included, composition focus plus instructor concerns
4	*Music Education in the Age of Artificial Intelligence, (2025)*	Narrative review	Broad	Not specified	Generative AI, virtual tutors	Composition and performance discussed	General educator implications	Access, personalisation; creativity concerns	Benefit, risk, ethics	Included, frames risks and benefits around creativity
5	Yuan (2024)	Empirical, intervention	Formal music instruction	Student sample	AI-assisted teaching system	Composition adjacent, skill training for rhythm	Teacher role not central	Rhythm accuracy improved, feedback responsiveness improved	Benefit, usability inferred	Included, evidence on learning effects from AI feedback systems
6	Jin and Zhao (2025)	Empirical, preprint	School-level music theory	Student sample	LLM teachable agent	Theory support feeding composition learning	Teacher view limited	Engagement up, retention up, cognitive load down	Benefit, effort	Included, composition-related learning support via LLM tutoring
7	Martínez-Heredia and López (2025)	Conceptual plus applied discussion, preprint	University composition	University learners	AI agents for music analysis	Harmonic and structural analysis for composition learning	Some teacher stance on overreliance	Visualisation helps, risk of algorithm dependence	Benefit, risk, ethics	Included, composition course relevance plus caution themes
8	Kılınçer (2025)	Empirical, survey	Pre-service teacher education	Pre-service music teachers	AI literacy and integration	Indirect, readiness for AI tools in music	Yes, direct teacher candidate perceptions	Moderate self-efficacy, low practical AI experience	Effort, readiness	Included, core teacher perception evidence
9	O'Leary (2025)	Conceptual, qualitative argument	Music education	Educators as focus	AI across teaching tasks	Includes composition and assessment issues	Yes, strong educator framing	Authorship, authenticity, assessment integrity concerns	Ethics, assessment integrity, risk	Included, key ethics and assessment construct source
10	Shaw (2024)	Practitioner-oriented analysis	School music education	Teachers, cases	AI in creative learning	Composition and creative tasks discussed	Yes, teacher mediation role	Need for ongoing learning, mediation between technology and artistry	Benefit, effort, equity, ethics	Included, teacher-facing implications
11	Kim and Park (2024)	Trend analysis	Korea, research corpus	Publications, not single sample	Composition tools, analytics	Composition strand present	Pedagogy gap highlighted	Innovation outpaces pedagogy research	Readiness, institutional fit	Included, supports claim about pedagogy gap
12	Smith (2024)	Conceptual overview, preprint	Broad	Not specified	Generative systems, chatbots	Composition assistance discussed	Teacher-facing implications	Creativity and human interpretation need protection	Risk, ethics	Included, frames cultural and creative risks
13	Holster (2024)	Practice-based study	Classroom music settings	Teachers and classrooms	Conversational AI, ChatGPT	Composition support and theory explanation	Yes, teacher observation and concerns	Participation up, dependency risk	Benefit, risk, effort	Included, teacher classroom experience evidence
14	Ou (2025)	Empirical, mixed methods	Practice learning	Learners	AI practice applications	Indirect, practice supports composition skill base	Teacher perspective not central	Motivation up, self-regulation up	Benefit, usability inferred	Included, outcomes relevant to adoption claims in reviews
15	Diraksin et al., 2025)	Empirical, case studies	Music education	Mixed stakeholders	Intelligent tutoring, assessment tools	Composition training included	Some teacher workload discussion	Workload down, assessment consistency up	Benefit, readiness	Included, implementation and workload theme

ID	Study (APA in-text form)	Publication Type	Education Level or Context	Participants Reported	AI Tool Category	Composition Related Task	Teacher Perspective Reported	Main Outcomes Reported	Perception Constructs Captured	Inclusion Decision, Reason
16	Frontiers in Psychology, (2025)	Empirical	Group composition learning	Students	Generative AI collaboration	Co-composition	Teacher perspective limited	Creative self-efficacy up, inclusion up	Benefit, risk	Included, composition-specific learning evidence
17	Membrane Technology Organization, (2024)	Empirical or applied report	Beginner training	Beginners	Adaptive learning system	Indirect, skill development	Teacher perspective absent	Motivation up, accuracy up	Benefit, usability inferred	Included, shows adaptive personalisation claims

Discussion And Implications For Ghanaian Colleges Of Education

What the results mean for teacher education, bounded by evidence

The included literature supports a consistent position: adoption outcomes depend on teacher capability to frame tasks, set boundaries, and design assessment that rewards process. This claim is supported across teacher-facing and policy-oriented scholarship, even when learner outcomes show positive gains (O'Leary, 2025; Shaw, 2024; Merchán Sánchez-Jara et al., 2024).

At the same time, the evidence base in the included set contains limited direct reporting from teacher-education institutions in sub-Saharan Africa. Implications for Ghanaian Colleges of Education therefore remain inferential, anchored in reported adoption barriers tied to readiness, usability, and governance in other settings (Daley, 2025).

Teacher preparation priorities for AI-assisted composition tools

The results indicate a training gap in AI literacy and pedagogical integration. Survey and synthesis work shows moderate confidence with limited hands-on AI practice among teacher candidates, alongside repeated calls for structured preparation (Kılınçer, 2025; Merchán Sánchez-Jara et al., 2024). For Ghanaian Colleges of Education, the evidence supports embedding three competencies into music teacher education:

1. Tool evaluation skills tied to instructional aims.
2. Task design that requires learner decision-making beyond AI output.
3. Assessment design that documents process and revision history (O'Leary, 2025; Cheng, 2025).

Assessment integrity and authorship management in composition coursework

The literature treats authorship and assessment integrity as core adoption barriers, not peripheral issues. Ethical analyses stress that composition assessment needs process evidence, not only final artefacts, to reduce plagiarism risk and protect learner agency (O'Leary, 2025; Cheng, 2025). For Ghanaian Colleges of Education, the evidence supports assessment formats such as draft logs, annotated revision trails, peer critique records, and reflective accounts of AI use, aligned with clear disclosure rules (Daley, 2025; O'Leary, 2025).

Institutional readiness and equity risks

Systematic reviews repeatedly report access, readiness, and governance constraints that shape uneven uptake (Merchán Sánchez-Jara et al., 2024; Zhang et al., 2025). The included set does not provide Ghana-specific infrastructure data, so no direct adoption claim is warranted. Still, the evidence supports a caution: where device access, internet stability, licensing, and staff development vary, AI integration risks uneven implementation across cohorts and campuses (Zhang et al., 2025; Daley, 2025).

Cultural fit limits in composition tools

Conceptual work warns that AI tools trained on dominant Western datasets risk narrowing musical representation and weakening culturally rooted creativity (Smith, 2024). The included set offers limited empirical testing of culturally diverse composition datasets, so this remains a risk statement rather than a measured outcome. For Ghanaian Colleges of Education, the evidence supports prioritising culturally responsive task design, where learners critique AI outputs against local musical norms and justify departures, rather than accepting outputs as neutral or standard (O'Leary, 2025; Smith, 2024).

Research agenda aligned with gaps in the evidence base

Given the absence of Ghana-based empirical work in the included set, the strongest evidence-based contribution is a research agenda. The reviewed literature supports the need for studies that:

Measure teacher educators' perceived benefit, effort, and risk tied to composition tools using validated constructs (Kılınçer, 2025).

Test assessment models that preserve authorship and process integrity in AI-supported composition tasks (O'Leary, 2025; Cheng, 2025). Document institutional readiness variables and adoption conditions in teacher education settings rather than only learner outcomes (Zhang et al., 2025).

Identified Research Gaps

Three research gaps stand out for Ghana. First, there's almost no evidence on how teacher educators in low-resource settings actually use AI tools in practice. Most current studies come from universities with stable infrastructure, which is not the same thing. Second, while teacher readiness is often mentioned, few studies examine how perception constructs—how teachers think and feel about AI—actually play out in classrooms. Third, many AI tools and examples are grounded in Western musical systems, leaving a big gap in understanding how these tools align with Ghanaian traditions and musical values. These gaps point to a clear research agenda: investigate how tutors in Ghana perceive AI-assisted composition tools, how they design assessments, and how local music pedagogy might shape or even correct AI systems. Society as a whole is created and inspired to "fail" before it learns, and this may apply here too.

Adoption-Readiness Model for Ghanaian CoEs

Based on the available evidence and its limits, a working model for AI adoption readiness in teacher education can be framed around four key domains, though they overlap in messy ways:

Teacher Training: Build AI literacy, provide guided practice with real tools, and establish routines for critique, revision, and reflective listening. Teacher educators need both content knowledge and pedagogical strategies to make AI meaningful, not mechanical.

Infrastructure and Access: Ensure reliable devices, connectivity, and software licensing across campuses. Monitor disparities closely to prevent unequal adoption that could disadvantage certain groups of students and create silent exclusions.

Institutional Governance: Develop clear policies around AI use—boundaries for assessment, expectations for authorship, and classroom integration standards. Institutions should set transparent norms so tutors and campuses don't drift apart in how they handle AI. Ethics and Cultural Fit: Promote process-based assessment and evaluate AI tools for alignment with Ghanaian musical systems. Support should go to tools that respect local traditions, encourage fairness, and protect learner agency.

This model is not prescriptive, not final either, but a starting point for planning, evaluation, and research within Ghanaian teacher education. It can guide curriculum development and policy design as AI becomes more visible, and maybe more confusing, in educational spaces.

Conclusion

This review synthesised recent literature on artificial intelligence in music education, with attention to implications for music teacher education in Ghanaian Colleges of Education. Across systematic reviews, empirical studies, and conceptual papers, the evidence identifies recurring AI-enabled uses in music learning, including automated feedback, adaptive practice, tutoring support, and generative assistance for composition tasks (Merchán Sánchez-Jara et al., 2024; Zhang et al., 2025; Yuan, 2024). Reported benefits cluster around efficiency of feedback, learner engagement, and support for practice routines, yet implementation patterns vary by institutional capacity and teacher preparation.

The literature also reports persistent constraints. Teacher readiness and AI literacy remain central barriers, with limited structured preparation reported across teacher education settings (Kılınçer, 2025; Shaw, 2024). Ethical and assessment concerns recur across studies, including authorship attribution, plagiarism risk, bias, and challenges to assessment integrity in AI-supported composition (O'Leary, 2025; Cheng, 2025). These issues often appear alongside limited institutional guidance, which increases uncertainty for teacher educators and undermines consistent classroom adoption (Daley, 2025).

A major evidence limitation is the absence of Ghana-based and sub-Saharan Africa teacher-education studies in the included set. Most findings derive from settings with stronger infrastructure and established technology support. This restricts direct transfer to Ghanaian Colleges of Education and positions current implications as evidence-bounded priorities for local research, curriculum planning, and professional learning design.

First, Colleges of Education should establish structured professional learning on AI-assisted composition tools for tutors and pre-service teachers. Training should cover tool functions, task design for composition learning, and strategies for guided critique of AI outputs. Professional learning should emphasise pedagogical decision-making, not tool operation alone (Merchán Sánchez-Jara et al., 2024; O'Leary, 2025).

Second, teacher education programmes should strengthen assessment guidance for AI-supported composition. Assessment should focus on process evidence and learner decisions. Institutions should use artefacts such as draft trails, revision logs, reflective commentaries, and peer feedback records. Programmes should also require an AI-use disclosure note that states tool use, prompts, and the learner's edits. This supports integrity and clarifies authorship boundaries (O'Leary, 2025; Cheng, 2025).

Third, Colleges should adopt clear institutional governance for ethical and responsible AI use in teaching and assessment. Policy should define acceptable use, attribution standards, data privacy expectations, and misconduct procedures. Policy should also specify tutor responsibilities in modelling ethical practice and supervising student use (O'Leary, 2025; Daley, 2025).

Fourth, curriculum integration should match infrastructure conditions in Colleges of Education. Programmes should prioritise low-data workflows, offline-capable tools where available, and blended routines that reduce dependence on continuous connectivity. Implementation should include periodic monitoring of tutor readiness and student learning experiences using a consistent perception framework aligned to the literature's constructs, including perceived instructional value, perceived effort, perceived risk, ethics, and assessment integrity (Merchán Sánchez-Jara et al., 2024; Zhang et al., 2025; Kılınçer, 2025).

Author contributions

Kow Arkhurst: Conceptualisation, literature identification, review protocol design, data extraction, coding and synthesis, drafting of the manuscript, revision and final approval. Richmond Amoh-Yeboah: Conceptualisation support, screening support, quality appraisal input, critical review of synthesis themes, editing and revision, final approval.

Wisdom Taylor: Method and reporting structure, table and matrix development support, coherence and argument review, language and formatting edits, final approval. All authors reviewed the final manuscript and approved it for submission.

Acknowledgements

The authors acknowledge the academic colleagues who provided feedback on the review structure and reporting format. The authors also acknowledge the editorial guidance that improved clarity, academic tone, and reporting transparency.

References

Carnovalini, F., & others. (2025). Personalised Music Education: A Systematic Review of AI Generation Methods. *IEEE Access*, *13*, 112758–112773. https://doi.org/10.1109/ACCESS.2025.3639898

Cheng, L. (2025). The Impact of Generative AI on School Music Education: Challenges and Recommendations. *Arts Education Policy Review*, *126*(4), 255–262. https://doi.org/10.1080/10632913.2025.2451373

Daley, M. (2025). Music Education and Artificial Intelligence: A Conversational Editorial. *Music Education Perspectives*, *11*(1), 5–10. https://doi.org/10.22176/act24.3.1

Diraksin, P., Luo, Q., Jirasanyansakul, P., & Wenxin, D. (2025). The Role of Artificial Intelligence in Enhancing Music Teaching and Learning Practices. *ASEAN Education Study*, *12*(3), 55–68.

Frontiers in Psychology. (2025). Collaborative Music Creation Supported by Generative AI. *Frontiers in Psychology*, *16*, 1709513. https://doi.org/10.3389/fpsyg.2025.1709513

Holster, J. (2024). Augmenting Music Education Through AI: Practical Applications of ChatGPT and Intelligent Tools. *Music Educators Journal*, *111*(1), 31–39. https://doi.org/10.1177/00274321241255938

Jin, H., & Zhao, L. (2025). *Exploring the Impact of an LLM-Powered Teachable Agent on Music Education*. https://arxiv.org/abs/2504.00636

Kim, J., & Park, S. (2024). Research Trends in Artificial Intelligence-Based Music Education in Korea. *Korean Journal of Research in Music Education*, *53*(2), 101–120.

Klnçer, Ö. (2025). Investigation of Music Teacher Candidates' AI Literacy and Technology Integration Self-Efficacy. *International Journal of New Trends in Music Education Studies*, *3*(1), 47–58. https://doi.org/10.51383/ijonmes.2025.417

Martínez-Heredia, A., & López, G. (2025). *AI Agents in Music Analysis: Pedagogical Implications and Challenges*. https://arxiv.org/abs/2511.13987

Membrane Technology Organization. (2024). AI-Driven Personalized Learning for Beginner Musicians. *Membrane Technology Journal*, *9*(4), 56–68.

Merchán Sánchez-Jara, J., Martínez-Gómez, J., & López-Sánchez, M. (2024). Artificial Intelligence-Assisted Music Education: A Critical Synthesis of Challenges and Opportunities. *Education Sciences*, *14*(11), 1171. https://doi.org/10.3390/educsci14111171

Music Education in the Age of Artificial Intelligence. (2025). Music Education in the Age of Artificial Intelligence. *International Journal of Scientific Research and Applications*, *13*(2), 45–61. https://doi.org/10.5296/ire.v13i1.22850

Odena, O., & Cabedo-Mas, A. (2024). Music Teachers' Perceptions of Generative AI in Composition Education. *British Journal of Music Education*, *41*(3), 245–260.

O'Leary, M. (2025). Pedagogical and Ethical Implications of AI in Music Teaching: Choices for Educators. *Action, Criticism, and Theory for Music Education*, *24*(3), 35–51. https://doi.org/10.22176/act24.3.35

Ou, J. (2025). Exploring the Impact of AI-Assisted Practice Applications on Music Learning. *Frontiers in Psychology*, *16*, 1675762. https://doi.org/10.3389/fpsyg.2025.1675762

Shaw, B. P. (2024). Implications for Music Educators in the Age of AI. *Music Educators Journal*, *111*(1), 22–30. https://doi.org/10.1177/00274321241296118

Smith, D. (2024). *Artificial Intelligence in Music Education*. ResearchGate. https://www.researchgate.net/publication/370876901

Stahlke, H. (2024). Generative AI in Music and Design Education: Student and Teacher Perspectives. *Design and Technology Education*, *29*(1), 45–62.

The Use of AI in Music Teaching in Higher Education: A Systematic Literature Review. (2025). ResearchGate Preprint. https://www.researchgate.net/publication/398125439

Vázquez-Parra, J. C., Henao-Rodríguez, C., Lis-Gutiérrez, J. P., & Palomino-Gámez, S. (2024). Importance of University Students' Perception of Adoption and Training in Artificial Intelligence Tools. *Societies*, *14*(8), 141. https://doi.org/10.3390/soc14080141

Yuan, F. (2024). Research on Music Teaching Systems Assisted by Artificial Intelligence. *Computers & Education: Artificial Intelligence*, *5*, 100273. https://doi.org/10.1016/j.caeai.2024.100273

Zhang, Y., Fen, B. W., Zhang, C., & Pi, S. (2025). Transforming Music Education Through Artificial Intelligence: A Systematic Literature Review on Enhancing Music Teaching and Learning. *International Journal of Interactive Mobile Technologies*, *18*(18), 76–93. https://doi.org/10.3991/ijim.v18i18.50545

Zhang, Y., & Liang, M. (2024). Attitudes Toward AI-Assisted Music Composition Among Music Education Students and Teachers. *International Journal of Music Education*, *42*(4), 512–528.

Zhao, Y., Ding, J., Lin, Y., Wang, Z., Shi, F., Yang, M., Zhang, X., & Ning, H. (2025). AI-Enabled Text-to-Music Generation: A Comprehensive Review of Methods, Frameworks, and Future Directions. *Electronics*, *14*(6), 1197. https://doi.org/10.3390/electronics14061197